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What Is Claimed Is:

1        1. A method for using empirical measurements of accesses to  
2 synchronization points within an application to construct a performance model for  
3 the application, comprising:

4              modifying the application to record statistics related to the synchronization  
5 points within the application;  
6              running the application to produce the statistics related to synchronization  
7 points;  
8              constructing the performance model based upon the statistics; and  
9              using the performance model to predict a performance of the application.

1        2. The method of claim 1,  
2              wherein constructing the performance model based upon the statistics  
3 involves constructing an analytic model for the application; and  
4              wherein using the performance model to predict the performance involves  
5 numerically solving the analytic model to predict the performance for the  
6 application.

1        3. The method of claim 1,  
2              wherein constructing the performance model based upon the statistics  
3 involves constructing a simulation model for the application; and  
4              wherein using the performance model to predict the performance involves  
5 running the simulation model to predict the performance for the application.

1           4. The method of claim 1, wherein modifying the application involves  
2 compiling the application with a profiling option in order to record the statistics  
3 related to the synchronization points.

1           5. The method of claim 1, wherein modifying the application involves  
2 modifying the executable code of the application to record the statistics during  
3 system calls that operate on the synchronization points.

1           6. The method of claim 1, wherein the statistics include:  
2           an identifier for a calling function;  
3           an identifier for a mutual exclusion variable;  
4           a time spent holding the mutual exclusion variable; and  
5           a frequency of accesses to the mutual exclusion variable.

1           7. The method of claim 1, wherein the statistics include a directed  
2 call graph specifying an ordering of function calls.

1           8. The method of claim 7, wherein constructing the performance  
2 model involves constructing a queuing model, wherein each synchronization point  
3 is a service center for jobs representing processes that circulate between service  
4 centers in a manner specified by the directed call graph.

1           9. A computer-readable storage medium storing instructions that  
2 when executed by a computer cause the computer to perform a method for using  
3 empirical measurements of accesses to synchronization points within an  
4 application to construct a performance model for the application, the method  
5 comprising:

- 6           modifying the application to record statistics related to the synchronization
- 7        points within the application;
- 8           running the application to produce the statistics related to synchronization
- 9        points;
- 10          constructing the performance model based upon the statistics; and
- 11          using the performance model to predict a performance of the application.

1           10. The computer-readable storage medium of claim 9,  
2       wherein constructing the performance model based upon the statistics  
3   involves constructing an analytic model for the application; and  
4       wherein using the performance model to predict the performance involves  
5   numerically solving the analytic model to predict the performance for the  
6   application.

1        11. The computer-readable storage medium of claim 9,  
2        wherein constructing the performance model based upon the statistics  
3 involves constructing a simulation model for the application; and  
4        wherein using the performance model to predict the performance involves  
5 running the simulation model to predict the performance for the application.

1           12. The computer-readable storage medium of claim 9, wherein  
2 modifying the application involves compiling the application with a profiling  
3 option in order to record the statistics related to the synchronization points.

1           13. The computer-readable storage medium of claim 9, wherein  
2 modifying the application involves modifying the executable code of the

3 application to record the statistics during system calls that operate on the  
4 synchronization points.

1 14. The computer-readable storage medium of claim 9, wherein the  
2 statistics include:

3 an identifier for a calling function;  
4 an identifier for a mutual exclusion variable;  
5 a time spent holding the mutual exclusion variable; and  
6 a frequency of accesses to the mutual exclusion variable.

1 15. The computer-readable storage medium of claim 9, wherein the  
2 statistics include a directed call graph specifying an ordering of function calls.

1 16. The computer-readable storage medium of claim 15, wherein  
2 constructing the performance model involves constructing a queuing model,  
3 wherein each synchronization point is a service center for jobs representing  
4 processes that circulate between service centers in a manner specified by the  
5 directed call graph.

1 17. An apparatus for using empirical measurements of accesses to  
2 synchronization points within an application to construct a performance model for  
3 the application, comprising:

4 a modification mechanism that is configured to modify the application to  
5 record statistics related to the synchronization points within the application;  
6 an execution mechanism that is configured to run the application to  
7 produce the statistics related to synchronization points;

8            a performance model construction mechanism that is configured to  
9 construct the performance model based upon the statistics; and  
10            a performance predicting mechanism that is configured to use the  
11 performance model to predict a performance of the application.

1            18.       The apparatus of claim 17,  
2            wherein the performance model construction mechanism is configured to  
3 construct an analytic model for the application; and  
4            wherein the performance predicting mechanism is configured to predict  
5 the performance of the application by numerically solving the analytic model.

1            19.       The apparatus of claim 17,  
2            wherein the performance model construction mechanism is configured to  
3 construct a simulation model for the application; and  
4            wherein the performance predicting mechanism is configured to predict  
5 the performance of the application by running the simulation model.

1            20.       The apparatus of claim 17, wherein the modification mechanism is  
2 configured to compile the application with a profiling option in order to record the  
3 statistics related to the synchronization points.

1            21.       The apparatus of claim 17, wherein the modification mechanism is  
2 configured to modify the executable code of the application to record the statistics  
3 during system calls that operate on the synchronization points.

1            22.       The apparatus of claim 17, wherein the statistics include:  
2            an identifier for a calling function;

1           an identifier for a mutual exclusion variable;  
2           a time spent holding the mutual exclusion variable; and  
3           a frequency of accesses to the mutual exclusion variable.

1       23.     The apparatus of claim 17, wherein the statistics include a directed  
2     call graph specifying an ordering of function calls.

1       24.     The apparatus of claim 23, wherein the performance model  
2     construction mechanism is configured to construct a queuing model, wherein each  
3     synchronization point is a service center for jobs representing processes that  
4     circulate between service centers in a manner specified by the directed call graph.  
5